

Appendix to: Review & Comment: on the FHWA Notice to the Federal Register and Technical Brief that rescinded Interim Approval (IA-5) for use of the Clearview type system.

On September 8, 2004 the Federal Highway Administration issued Interim Approval IA-5 to allow optional use of the Clearview font for positive contrast applications on guide signs based on research studies and field review.

On January 25, 2016 the Federal Highway Administration placed a Notice in the Federal Register rescinding the Interim Approval IA-5.

On January 28, 2016 the government issued an accompanying “Technical Brief” to clarify their disallowing use of the Clearview typeface in positive contrast highway guide sign applications, and stated that FHWA had no intention to pursue further consideration, development or support of an alternative letter style.

In review, this notice and technical brief misrepresents the history of this effort, provides an incomplete summary of the research and invokes misapplication of the font that has nothing to do with its effectiveness when properly applied.

Copies of the termination documents are attached with comment in side bars.

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DEPARTMENT OF TRANSPORTATION**Federal Highway Administration****National Standards for Traffic Control Devices; the Manual on Uniform Traffic Control Devices for Streets and Highways; Notice of Termination of Interim Approval IA-5**

AGENCY: Federal Highway Administration (FHWA), Department of Transportation (DOT).

ACTION: Notice.

SUMMARY: The Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) is incorporated in our regulations, approved by FHWA, and recognized as the national standard for traffic control devices used on all streets, highways, bikeways, and private roads open to public travel. This notice terminates the Interim Approval for Use of Clearview Font for Positive Contrast Legends on Guide Signs (IA-5), issued September 2, 2004, as authorized by Section 1A.10 of the MUTCD, and discontinues the provisional use of an alternative lettering style in traffic control device applications. The result of this termination rescinds the use of letter styles other than the FHWA Standard Alphabets on traffic control devices, except as provided otherwise in the MUTCD. Existing signs that use the provisional letter style and comply with the Interim Approval are unaffected by this action and may remain as long as they are in serviceable condition. This action does not create a mandate for the removal or installation of any sign. This action does not amend any provision of the MUTCD.

DATES: Effective 30 days after publication in the Federal Register.

FOR FURTHER INFORMATION CONTACT: For questions about this notice, contact Mr. Kevin Sylvester, MUTCD Team Leader, FHWA Office of Transportation Operations, (202) 366-2161, or via email at Kevin.Sylvester@dot.gov. For legal questions, please contact Mr. William Winne, Office of the Chief Counsel, (202) 366-1397, or via email at William.Winne@dot.gov. Office hours are from 8:00 a.m. to 4:30 p.m., e.t., Monday through Friday, except Federal holidays.

SUPPLEMENTARY INFORMATION:**Background**

Numerous research efforts have taken place over the last 15 years with the goal of improving the legibility of highway signs. One area of focus has been on guide signs. As a result of some early studies,¹ FHWA issued an Interim Approval allowing provisional use of an alternative lettering style known as Clearview™ for signs in positive

<p><i>Subsequent evaluations continue to show significant improvement over Standard Alphabets. (8)</i></p>	<p>contrast color orientations (lighter legend on darker background)² Although the research supported only one series of this lettering style, the Interim Approval was written in a way that would authorize narrower letter forms, to correspond to the system of the FHWA Standard Alphabets, in anticipation of successful future research evaluations. However, subsequent evaluations showed no benefit to the narrower letter forms and degraded sign legibility when compared to the corresponding FHWA Standard Alphabet series.³ Additionally, tests of alternative lettering in negative contrast color orientations (dark legend on lighter background, such as for regulatory and warning signs) showed no improvement and significantly degraded legibility of the sign.⁴ Ultimately, the consistent finding among all the research evaluations is that the brightness of the retroreflective sheeting is the primary factor in nighttime legibility.</p>	<p><i>Design and research addressed two series: E-Mod. and Series D with significant findings on mixed case readability. The IA-5 included common positive contrast applications. (5,6,8)</i></p>
<p><i>Letterform design is primary as brighter materials evolved and design did not follow. Had letterforms not been the issue, 3M would have never contributed to this design/research program. (5,6)</i></p>	<p>The presence and availability of two separate letter styles with differing criteria have resulted in significant confusion and inconsistency in highway sign design, fabrication processes, and application. Although the terms of FHWA's 2004 Interim Approval are explicit, misunderstandings and misapplications of the provisional letter style have resulted. Inconsistent sign design practices are becoming more common and may have coincided with the provisional allowance of an alternative lettering style due to a lack of consistent implementation and inaccurate presumptions that lesser sign design criteria, such as reduced interline and edge spacing, are broadly acceptable. Additionally, many agencies believed that the alternative lettering style should be used in all applications and that all lettering should be displayed in upper and lowercase</p>	<p><i>Legibility research for negative contrast shows significant gains over FHWA mixed-case (21-31 %) with older drivers. (8)</i></p>
<p><i>Coincident events do not prove causality.</i></p>	<p>lettering, regardless of the type of message. There is also considerable confusion that the requirement of the MUTCD to display destination and street names in upper and lowercase lettering equates to the use of the provisional lettering style rather than the Standard Alphabets. In actuality, there is no interdependency between letter style and case.</p>	<p><i>Any confusion based on FHWA Standards or Clearview are easily addressed in appropriate guidance. Both work on the same layout grids designed for mixed case applications.</i></p>
<p><i>There is nothing inherent in Clearview to support this claim. 18 states have used Clearview effectively for years.</i></p>	<p>lettering, regardless of the type of message. There is also considerable confusion that the requirement of the MUTCD to display destination and street names in upper and lowercase lettering equates to the use of the provisional lettering style rather than the Standard Alphabets. In actuality, there is no interdependency between letter style and case.</p>	<p><i>This is a guidance issue that has no relationship to IA-5 and the readability of guide signs.</i></p>
<p><i>This is selection, not confusion. Clearview is 18-35 % more legible than comparable FHWA Standard Alphabets in the same application with older drivers being the prime beneficiary. (8)</i></p>	<p>lettering, regardless of the type of message. There is also considerable confusion that the requirement of the MUTCD to display destination and street names in upper and lowercase lettering equates to the use of the provisional lettering style rather than the Standard Alphabets. In actuality, there is no interdependency between letter style and case.</p>	<p><i>This is a guidance issue that has no relationship to IA-5 and the readability of guide signs.</i></p>

Purpose of This Notification

<p><i>The benefits of the Clearview project have been significant. Safety upgrades have been made without increased cost. Eighteen states have shown dramatic improvement in guide signing. Clearview has aided older drivers. Clearview provides a consistent structural framework for applications design. (11, 12)</i></p>	<p>Uniformity in the display of traffic control devices is central to the underlying foundation of the MUTCD. As such, FHWA establishes the criteria therein with uniformity in mind. This uniformity extends not only to the content of the message displayed, but also to the format and appearance of the display itself. Although seldom specifically identifiable by the motorist, non-uniformity of a sign display or sequence of signs might exhibit itself in less direct ways, such as diminished legibility requiring additional glance time directed toward a sign or group of signs instead of toward the traffic on the road.</p>	<p><i>The Clearview design team provided two major studies that afford greater uniformity and consistent readability for both conventional road and freeway signs. (9,10)</i></p> <p><i>The 50 year old FHWA standards are not consistent for common applications and result in a cluttered road and street scape.</i></p>
<p><i>The benefits of the Clearview project have been significant. Safety upgrades have been made without increased cost. Eighteen states have shown dramatic improvement in guide signing. Clearview has aided older drivers. Clearview provides a consistent structural framework for applications design. (11, 12)</i></p>	<p>The FHWA is committed to exploring solutions that can significantly contribute to enhanced road user safety and are readily and feasibly implemented. In this particular case, there is no benefit of the alternative method that cannot be similarly achieved within the established practice. In many cases, the established practice actually demonstrated benefits that the alternative could not achieve. The FHWA believes that devoting further resources to the development of an alternative will not yield dramatic different results that would warrant an institutional change.</p>	<p><i>State DOT reviews of installed programs suggest Clearview is easier to read and allows more time for eyes-on-the-road. (12)</i></p> <p><i>A major multi-year study confirmed that Clearview; saves lives, reduces severity of accidents, reduces accidents, and provides cost savings compared to current practice. (11)</i></p>

Conclusion

Based on these findings, FHWA does not intend to pursue further consideration, development, or support of an alternative letter style. Accordingly, FHWA discontinues further implementation of an alternative letter style and terminates and rescinds the Interim Approval for new signing installations, except as otherwise provided in the MUTCD. Existing signs that use the provisional letter style and comply with the Interim Approval are unaffected by this action and may remain as long as they are in serviceable condition. This action does not create a mandate for the removal or installation of any sign. This action does not amend any provision of the MUTCD.

Authority: 23 U.S.C. 101(a), 104, 109(d), 114(a), 217, 315, and 402(a); 23 CFR 1.32; and, 49 CFR 1.85.

Issued on: January 15, 2016.

Gregory G. Nadeau, Administrator, Federal Highway Administration.
[FR Doc. 2016-01383 Filed 1-22-16; 8:45 am]

BILLING CODE 4910-22-P

- 1 Carlson, P.J., Evaluation of Clearview Alphabet with Microprismatic Retroreflective Sheetings, Report No. FHWA/TX-02/4049-1. Texas Transportation Institute, August 2001, resubmitted October 2001.
- 2 Interim Approval 5 can be accessed at the following Web address: http://mutcd.fhwa.dot.gov/res-ia_clearview_font.htm.
- 3 Chrysler, S.T., P.J. Carlson, and H.G. Hawkins. Nighttime Legibility of Ground-Mounted Traffic Signs as a Function of Font, Color, and Retroreflective Sheeting Type, Report No. FHWA/TX-03/1796-2. Texas Transportation Institute, September 2002.
- 4 Holick, A., S.T. Chrysler, E. Park, and P.J. Carlson. Evaluation of the Clearview™ Font for Negative Contrast Traffic Signs, Report No. FHWA/TX-06/0-4984-1. Texas Transportation Institute, January 2006, resubmitted April 2006.

Augmented bibliography to include research not included when this notice was placed in the Federal Register.

Additional references not included by FHWA but applicable to any evaluation of IA-5

- 5 P. Garvey, M. Pietrucha, and D. Meeker. (June 15, 1996) Development and Testing of a New Guide Sign Alphabet. Pennsylvania Transportation Institute (PTI) for the 3M Company.
- 6 P. Garvey, Martin T Pietrucha, and Donald Meeker. (1997) Effects of Font Capitalization on Legibility of Guide Signs, Transportation Research Record, Number 1605, Washington, D.C. 1997
- 7 H. Gene Hawkins, Jr., Dale L. Picha, Mark D. Wooldridge, Francis K. Greene, and Greg Brinkmeyer., Performance Comparison of Three Freeway Guide Sign Alphabets, Transportation Research Record 1692 (1999)
- 8 P. Garvey, M.J. Klana, Wei-Yin Eie, and M Pietrucha. *The Legibility of the Clearview Typeface System compared to Standard Highway Alphabets on Negative and Positive Contrast Signs*. The T.D. Larson Transportation Institute for Maryland SHA, Michigan DOT and US DOT Research & Innovative Technology Administration (February 1, 2015).
- 9 D. Meeker, M. Pietrucha, P. Garvey., Proportion Based Format System for Conventional Road Guide Signs., Transportation Research Record No. 1973, NRC/TRB. (2006).
- 10 D. Meeker, M. Pietrucha, P. Garvey., Proportion Based Format System for Freeway & Expressway Guide Signs., Presented at the TRB Annual Meeting. (2008). ASCE Journal of Transportation Engineering. (2010).
- 11 V. Kwizigile, Jun-Seok Oh, R. Van Houten, D. Prieto, R. Boateng, L. Rodriguez, A. Ceifetz, J. Yassin, J. Bagdade, P. Andridge. Evaluation of Michigan's Engineering Improvements for Older Drivers. Western Michigan Univ. Michigan Department of Transportation. RC 1636, 2015.
- 12 Mahmassani, H. S., C. W. Frei, and M. Saberi. Clearview™ Font in Illinois: Assessing IDOT Experiences and Needs , Report No. FHWA-ICT-13-003. Northwestern University Transportation Center, January 2013.

As an organization that puts public safety in the forefront, it is counter-productive for the FHWA to throw-out Clearview and the lessons learned.

The Clearview designs have provided statistically significant improvement in readability and legibility for older drivers and all drivers. This effort has stimulated cities and states to learn how signage can be improved and stimulated state sponsored research to study the effectiveness of implementation efforts. (11, 12)

City and state highway engineers have also been afforded a greater understanding of how type and sign formats can improve the effectiveness of various sign types.

In essence, what has been a great help to older drivers has helped all drivers.

This Technical Review (1.28.2016) was prepared by FHWA to clarify their termination of approved use of the Clearview.

The development of Clearview evolved as engineers and designers came together to learn how road sign type could improve safety for surface transportation signing. The design was built around five iterations of the typeface between 1991 to 2002. Much of this discussion in this Technical Brief revolves around Series E-modified as used on freeway signs.

Although E-modified was integral to this work, comparing all upper case letters to mixed case and the creation of mixed case alphabets for the five other weights was a major component of this effort. The design program was supported by research and field review. Critical research that was germane to this development was not referenced by the FHWA in terminating this work. Responses to the Technical Brief are in the side bars.

TECHNICAL BRIEF

Federal Highway Administration

Manual on Uniform Traffic Control Devices for Streets and Highways: Termination of Interim Approval No. 5, Clearview Font for Positive Contrast Legends on Guide Signs

Introduction: On January 25, 2016, the FHWA published a notice in the Federal Register¹ terminating the use of an alternative letter style, Clearview™, on traffic control devices. The use of this alternative letter style was authorized under the provisions of the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) for Interim Approval. Agencies wishing to use the alternative letter style were required to request approval from FHWA. The alternative letter style has not been adopted in the MUTCD.

The project scope and mission is misstated. The project focus addressed the needs of older drivers, the design and comparative readability of mixed case legends for secondary road guide signs with alternatives developed for both Series e-Modified and Series D.

A component of this identified significant improvement in guide sign recognition when comparing a mixed case design to all upper case Series D.

Research History and Implementation: Initial studies evaluated only one letter form type of the provisional letter style with two different intercharacter spacing criteria. These are now known as 5-W and 5-W-R, the latter of which has a compressed intercharacter spacing so that the length of a word would approximate that of the same word composed of the FHWA Standard Alphabet Series E(modified). This compressed version was found to provide no improvement over Series E(modified). These studies did not evaluate numerals for legibility or recognition. The narrower letter forms of the provisional letter style (designated as 1-W, 2-W, 3-W, and 4-W) were also not evaluated for legibility in these studies.

The study² on which the Interim Approval was primarily based found that changing the type of retroreflective sheeting alone resulted in a 6% improvement in legibility to the FHWA Standard Alphabet Series E(modified). However, this quantitative result was not otherwise reported as a major finding. The practical difference attributed to the letter style was characterized as “modest” and the apparent improvement of the provisional letter style could be “partly attributed to [its] increased size.” Because of the narrowly focused research statement, which examined the cumulative effect of a change to two variables, the study recommended that the sponsoring agency adopt a new standard to change both the retroreflective sheeting to microprismatic and the letter style to 5-W³. The fact that the sponsoring agency already owned 100 licenses of the design and fabrication software for the provisional letter style and had furnished one licensed copy to a sign fabricator was also noted in the recommendation.

Subsequent testing^{4,5} showed that FHWA Standard Alphabet Series D resulted in longer legibility distances than the 3-W letter style of the alternative alphabet.

Counter to this claim, the referenced research showed significant improvement with older drivers receiving the greatest benefit. (5)

Counter to this claim, legibility research of mid-weights was completed and shows 18 to 35 percent improvement with narrower Clearview letterforms compared to mixed case Standard Alphabets. Variation depends on type series. Studies include both positive and negative contrast versions in older driver study. (22)

Early data showed that all uppercase Standard Alphabets compared to Clearview upper case had similar legibility. Essentially block letters are block letters regardless of name.

Current data shows an improvement of 29 percent (day) and 22 percent (night) with older drivers when Clearview mixed case is compared to FHWA Series D mixed case. (22)

¹ *Federal Register*, Vol. 81, No. 15. 81 FR 4083. National Archives and Records Administration, January 25, 2016.

² Carlson, P. J. *Evaluation of Clearview Alphabet with Microprismatic Retroreflective Sheetings*, Report No. FHWA/TX-02/4049-1. Texas Transportation Institute, August 2001, resubmitted October 2001.

³ The sponsoring State agency adopted this recommendation, but substituted 5-W-R for 5-W as its standard.

⁴ Chrysler, S. T., P. J. Carlson, and H. G. Hawkins. *Nighttime Legibility of Ground-Mounted Traffic Signs as a Function of Font, Color, and Retroreflective Sheeting Type*, Report No. FHWA/TX-03/1796-2. Texas Transportation Institute, September 2002.

⁵ Holick, A. and P. J. Carlson. *Nighttime Sign Legibility as a Function of Various Combinations of Retroreflective Sheeting and Font*, Report No. FHWA/TX-04/1796-4. Texas Transportation Institute, September 2003.

Legibility and recognition deficiencies with numerals of the provisional style were reported in a field experiment as early as 2009. A formal evaluation⁶ later confirmed that the numerals of the Standard Alphabets exhibited superior performance when compared with those of the provisional lettering style.

This study was declined journal publication based on undocumented assumptions in design and results.

This was an incomplete and narrowly focused study. No study corroborates findings.

A 2014 study⁷ found that there is no practical difference between Series E(modified) of the Standard Alphabets and 5-W of the provisional letter style when tested in positive-contrast color orientations.

Explorations of the provisional letter style in negative-contrast color orientations⁸ revealed that the provisional letter style actually reduced the nighttime legibility when compared with the Standard Alphabets.

This study has nothing to do with the positive contrast Clearview as used for motorist guidance.

Recognition vs. Pure Legibility

The premise is wrong. Mixed case word pattern recognition is critical to wayfinding and was a integral to the Clearview design. (19, 20, 22)

Research has focused primarily on the legibility of one letter style compared to another. One of the studies acknowledged the fact that the excessively long legibility distances reported in some of the earlier work were actually the result of recognition, rather than legibility, due to learning effects by the participants among the set of test words. These research evaluations did not necessarily simulate the actual process of reading a sign: detection, recognition, and reaction via multiple glances. While legibility alone might be considered a valid surrogate measure for the entire process of interpreting a highway sign, marginally differing results do not necessarily indicate a practical significance that can justify an institutional or systematic change.

Recognition distance of desired destination name is significantly longer than pure legibility if word pattern is properly displayed.

Degradation of Consistency in Signing Layouts

The presence and availability of two separate letter styles with differing criteria have resulted in significant confusion and inconsistency in the highway sign design and fabrication processes. Although the terms of the FHWA's 2004 Interim Approval are explicit, misunderstandings and misapplications of the provisional letter style have resulted. In 2011, the FHWA issued a *Design and Use Policy*⁹ on this topic that included explicit criteria in question-answer format with photographic examples to illustrate acceptable and unacceptable practices. This additional guidance has failed to allay these practices. The following are representative examples of ways in which these concerns have manifested themselves:

States use Clearview in positive contrast as per the IA-5 for guide signs to aid older and all drivers.

- **Sign Design.** Poor sign design practices are becoming unduly institutionalized. This phenomenon appears to have coincided with the provisional allowance of an alternative lettering style due to a lack of consistent implementation and inaccurate presumptions

Citations of random exceptions in negative contrast are not applicable to IA-5.

Road sign clutter and inconsistent applications are nothing new under current FHWA standards.

⁶ Miles, J., B. Kotwal, S. Hammond, and F. Ye. *Evaluation of Guide Sign Fonts*, Report No. MN/RC 2014-11. Texas A&M Transportation Institute, February 2014.

⁷ Ibid.

⁸ Holick, A., S. T. Chrysler, E. Park, and P. J. Carlson. *Evaluation of the Clearview™ Font for Negative Contrast Traffic Signs*, Report No. FHWA/TX-06/0-4984-1. Texas Transportation Institute, January 2006, resubmitted April 2006.

⁹ <http://muted.fhwa.dot.gov/resources/clearviewdesignfaqs/index.htm>

Creating methods to afford greater consistency for layout of existing road signs was an integral part of this project. (23, 24)

Linking the clutter and inconsistency of American road signs to the introduction of Clearview for guide signs is not applicable to the termination of IA-5.

Coincident events do not prove causality.

that lesser sign design criteria, such as reduced interline and edge spacing, are broadly acceptable.

Reference to usage in applications beyond IA-5 has nothing to do with the goal of this older driver design and research program using positive contrast applications.

- **Incorrect Applications of the Provisional Letter Style.** Many agencies erroneously believed that the alternative lettering style should be used in all applications and that all lettering should be displayed in upper- and lower-case lettering, regardless of the type of message. While there is evidence of this phenomenon occurring at State levels, these misunderstandings have metastasized at the local levels, in part, due to inaccurate or incomplete reports published in news media and trade journals, and promotional efforts of commercial entities, including some associated with the early development of the provisional letter style. There is also considerable confusion that the requirement of the MUTCD to display destination and street names in upper- and lower-case lettering equates to the use of the provisional lettering style rather than the Standard Alphabets. In actuality, there is no interdependency between letter style and case.

Clearview is used because it is easier to read.

The general assumption by state DOTs is that road signs using Clearview create a safer highway. As Illinois-DOT noted in a survey; Clearview allows for more "eye time" on the road.(13, 26)

Negative contrast has nothing to do with making guide signs easier to read at night for older drivers.

- **Negative-Contrast Applications of the Provisional Letter Style.** Commercial availability and promotion of the alternative letter style for negative-contrast color orientations—which was not part of the Interim Approval—have also resulted in confusion among agencies and sign manufacturers. Regulatory and warning signs, including some as basic as the standard Speed Limit sign, have been observed using the alternative lettering style that has not been approved for use due to its inferiority to the Standard Alphabets in negative-contrast color orientations¹⁰.

Research shows an 18 to 35 percent improvement (depending on weight) using Clearview compared to mixed case Standard Alphabets.(22)

The Interim Approval is for positive contrast applications.

Conclusions of Research Evaluations

Clearview development was the result of a design project validated by research. Without design there is no research.

A significant number of research studies have been performed in pursuit of an alternative letter style. However, inconsistent or counterintuitive conclusions have been drawn from the results as reported to support or promote use and/or further study of an alternative letter style. The following examples illustrate this concern:

Confusion of this nature is not applicable to IA-5 termination.

Many studies executed, published and guided this project were not referenced in this Technical Brief.

(19, 20, 21, 22, 25, 26, 27, 28, 29, 30 and 31)

The goals for this study were successful. The font design tests well and the applications work as planned.

The research path is not necessarily a clean lineal process.

- **Sign Size.** The impetus reported for pursuing an alternative letter style was to avoid the need for larger lettering, thereby avoiding larger sized signs. With the standard spacing of 5-W lettering, the word lengths are typically longer than with Series E(modified), resulting in a larger sign.

Same size Clearview 5-W-R out performs E-Modified by a minimum of 9.5 percent.(5)

- **Increase in Letter Height to Accommodate an Alternative Letter Style.** A 2003 study¹¹ concluded that 3-W lettering of the provisional style in a larger letter height produces longer legibility distances than Series D in a smaller letter height. The researchers recommended that 8-inch 3-W lettering be used to replace all signs that used 6-inch Series D lettering. While increases in letter heights in this range can result in increased legibility distances independent of letter style, they will also result in larger signs, including with this scenario. The additional costs associated with larger sign sizes appear not to have been considered in making this recommendation. The recommendation to increase the letter height by 2 inches in order to justify the use of the alternative letter style on conventional roadways contravenes the original premise of considering an alternative letter style: improve legibility without costly increases in sign sizes. Following such a recommendation would result in an 80% increase in the

Although this particular reference may be viewed as an imperfect piece of research design, at the time, it appeared logical based on the investigators' task.

In the end, once legibility and recognition performance are determined, the sign legend is sized to prevailing speed and road width.

¹⁰ Holick et al. *Evaluation of the Clearview™ Font for Negative Contrast Traffic Signs.*

¹¹ Holick and Carlson. *Nighttime Sign Legibility.*

The use of Clearview in a statewide study comparing long term accident date to reduce fatalities, reduce the severity of crashes, reduce crashes and lower highway management costs (26).

Comparative economic analysis appears inappropriate in a study addressing safety and motorist requirements. Cost benefit is generally tied to a comparative impact of a particular strategy once installed.

area for a typical one-line Destination sign. The increase in area for a three-line Destination sign typically used at conventional road junctions would be 95%.

- **Compressed Intercharacter Spacing.** To mitigate the issue of larger signs, which would often necessitate replacement of the supporting structure, compressed intercharacter spacing criteria were developed for the provisional 5-W letter forms, referred to as 5-W-R. The use of 5-W-R is restricted to retrofits where an existing sign support structure that is still in serviceable condition does not have the capacity to accommodate a larger sign. It was expected that these cases would be relatively rare. However, some agencies have specified the compressed intercharacter spacing of 5-W-R as their default standard for all new signs, including those installed on new support structures, resulting in no net improvement over the Standard Alphabets that these signs replaced.

Clearview provides a significant improvement without increase in sign size compared to E-modified. Only exceptionally long words affect size.(5)

Larger structures have not been an issue for implementation.

The referenced study that was limited to one font weight was criticized to having flawed findings and did not include the data needed to make recommendations of this type.

- **Comprehensive vs. Incremental Analysis of Results.** While the most recent study suggested that there is no practical advantage to using the alternative lettering style over the Standard Alphabets because of the lack of consistent improvement in the legibility index, it questioned whether it is possible to achieve additional improvements in legibility. Instead, the researchers recommended that any future research on letter style focus on improvements that would reduce the cost of signs without affecting their safety performance. This recommendation did not consider the inconsistencies that have arisen due to the presence of two different lettering styles and criteria.

The practical advantage of using Clearview is increased legibility and readability. With positive and negative contrast options, older drivers are aided. Safety alone adds value. (5,22, 26)

- **Specific Focus of Research Evaluations.** Early research made iterative revisions to letter forms, size, and spacing of an alternative letter style until what appeared to be a statistically significant improvement resulted, but only for the alternative letter forms. Development of an alternative letter style eventually became self-propagating, excluding any consideration of optimizing the established Standard Alphabet letter forms and other criteria such as stroke width, loop height, or intercharacter spacing. This process unnecessarily presumed a fundamental dysfunction with the existing practice that could not be rectified. One study¹² in which “no conclusion can be drawn about the relative legibility” based its recommendation for letter style on a different study rather than the one conducted.

Original attempts to upgrade existing fonts proved impossible based on the criteria for design.

Throughout the development the Clearview (between 1991 to 2004) the process was documented for and demonstrated to FHWA.

Clearview uses same interline space as standard alphabets for mixed case applications. The FHWA assumption has no basis if signs are formatted with standard line space. This has worked perfectly on thousands of signs.(23, 24)

- **Interline Spacing.** The closed-course research evaluations did not use signs with multiple lines of legend that would simulate actual highway signing. Because the interline spacing is customarily based on the initial upper-case letter height, and the lower-case loop and rising stem heights of the provisional style are larger than those of the Standard Alphabets, the resulting space between lines of legend is reduced. The effect of this apparent reduced interline spacing was not measured. Reports of signs whose legends appear crowded are likely attributable to this effect.
- **In-Service Performance and Comparison.** A recent field evaluation¹³ observed no statistically significant difference between new signs that used the provisional 5-W lettering and a combination of new and existing signs that used Series E(modified).

The referenced study was an observation not comparative research. The FHWA fails to note that the study made two significant observations concerning readability. State highway engineers said: 1) signs using Clearview signs were easier to read and afford more time for eyes on the road and 2) lighting was removed when the old E-modified signs were replaced with new Clearview signs.(13)

¹² Smiley, A., C. Courage, T. Smahel, G. Fitch, and M. Currie. *Required Letter Height for Street Name Signs: An On-Road Study*, Paper No. 01-2225. Human Factors North and Toronto Transportation, 2001.

¹³ Mahmassani, H. S., C. W. Frei, and M. Saberi. *Clearview™ Font in Illinois: Assessing IDOT Experiences and Needs*, Report No. FHWA-ICT-13-003. Northwestern University Transportation Center, January 2013.

The recommendation of this study was to continue using Clearview for positive-contrast signs based on the fact that it had been implemented and there was no difference or negative reaction reported. Though, there appeared to be no consideration of the need to continue to use the Standard Alphabets in the majority of signing applications. This evaluation concluded that retroreflective sheeting materials might affect legibility, regardless of the letter style, corroborating past evidence. Additionally, it was reported in this evaluation that the intercharacter spacing of Clearview was often “manually adjusted” to avoid increasing the size of signs.

This referenced font copied the mathematical proportions of Clearview letterforms and digitally draped the designs over E-modified. The study then compared the Clearview and the contorted option to E-modified.

- ***Practical Significance.*** The 2014 study¹⁴ evaluated a modification of the Standard Alphabets, using larger lower-case letters and a lesser stroke width based on Series E(modified). Based on a comparison between the comparable alternative alphabets and the Standard Alphabets, there was no statistically significant difference in the legibility and/or recognition that could justify further exploration of any one of the letter styles over another. Further, legibility and recognition of numerals of the alternative alphabet were found to be inferior to those of the Standard Alphabets.

Implementation

Interestingly, a number of agencies are now using 20-inch leading upper-case letters with either 5-W or 5-W-R of the provisional lettering style. However, there is not necessarily a proportional increase in legibility or recognition with increases in letter height^{15, 16}. The basic premise of the development of an alternative letter style was to address a generalized hypothesis¹⁷ that letter heights of 20 inches would be needed to address the needs of older drivers, partly due to irradiation that can occur with different combinations of high-brightness retroreflective materials. This conclusion was extrapolated from a laboratory simulation and came during the infancy of higher-brightness retroreflective background sheeting on highway guide signs. It was intended to address a more practical visual acuity that would represent a broader cross-section of drivers and was at best, an approximation, as the actual Standard Alphabets were not used in this simulation. The research on an alternative lettering style was promoted largely as a means to avoid unnecessarily enlarging signs to meet this recommendation (cited in various articles as anywhere between a 20% increase to as much as a 33% increase), thereby sparing transportation agencies those additional costs while gaining the benefit of improved effectiveness. The presumption was that letter forms completely different from those of the Standard Alphabets would be the solution and did not examine modification to or optimization of the established Standard Alphabet letter forms. In fact, even the early research¹⁸ had determined that it was the relative contrast of the level of retroreflectivity used for the legend and background that was the critical factor in the legibility and that high-contrast brightness combinations should be avoided.

The approach to design and reasons for change were well documented and provided to FHWA at every step in the process.

The study was poorly executed; no differences were found between the three options.

This is not a justification to terminate Clearview.

The primary evaluation is based on the final product.

The development and testing of a typeface design is independent of how it is used.

The Clearview type designs were approved for use based on the performance. The government allowed qualified use to aid older drivers and all drivers.(26)

Any change will require an informed transition.

Given the success of the Clearview fonts as used on guide signs, it would seem that the FHWA would be more interested in learning how to improve a good thing instead of terminating it.

Eighteen states had comprehensive implementation programs, some had substantial research and could have shared their experience with the FHWA.

¹⁴ Miles et al. *Evaluation of Guide Sign Fonts*.

¹⁵ Mace, D. J., P. M. Garvey, and R. F. Heckard. *Relative Visibility of Increased Legend Size vs. Brighter Materials for Traffic Signs*, Report No. FHWA-RD-94-035. Federal Highway Administration, 1994.

¹⁶ Garvey, P. M. and D. J. Mace. *Changeable Message Sign Visibility*, Report No. FHWA-RD-94-077. Federal Highway Administration, April 1996.

¹⁷ Staplin, L. K., K. Lococo, and J. Sim. *Traffic Control Design Elements for Accommodating Drivers with Diminished Capacity*, Report No. FHWA-RD-90-055. Federal Highway Administration, 1990.

¹⁸ Mace et al. *Relative Visibility*.

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The issues of consistency, use of mixed case were researched in great detail by Markowitz, et al. when the MUTCD was an infant (27).

The greatest influence on road sign design is documented in the work of Jock Kinneir and Margaret Calvert for British road signing. Although Clearview typeface out performs British Transport (21) it was a worthy influence and a system that has stood the test of time in many European, African countries (30, 31).

